



Measuring, Reporting, Verifying. A Primer on MRV for Nationally Appropriate Mitigation Actions

Hinostroza, Miriam L.; Lütken, Søren; Aalders, Edwin; Pretlove, Bente; Peters, Niel; Olsen, Karen Holm

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Hinostroza, M. L. (Ed.), Lütken, S., Aalders, E., Pretlove, B., Peters, N., & Olsen, K. H. (2012). *Measuring, Reporting, Verifying. A Primer on MRV for Nationally Appropriate Mitigation Actions*. UNEP Risø Centre on Energy, Climate and Sustainable Development. Department of Management Engineering. Technical University of Denmark (DTU).

General rights

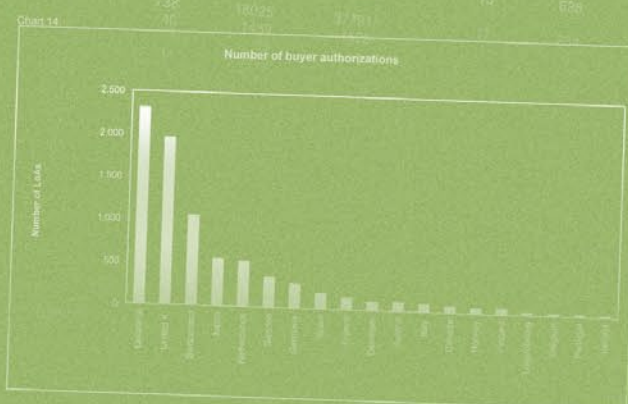
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Measuring Reporting Verifying

A Primer on **MRV** for
Nationally Appropriate Mitigation Actions



Measuring Reporting Verifying

A Primer on **MRV** for Nationally Appropriate Mitigation Actions

Editor:

Miriam Hinostroza, URC

Authors:

Søren Lütken, URC

Edwin Aalders, DNV

Bente Pretlove, DNV

Noel Peters, DNV

Karen Holm Olsen, URC

March 2012

UNEP Risø Centre

Technical University of Denmark

4000 Roskilde, Denmark

www.uneprisoe.org

ISBN: 978-87-550-3949-0

Graphic design: Phoenix Design Aid A/S, Denmark

Disclaimer:

The findings, interpretations and conclusions expressed in this Primer are entirely those of the authors and should not be attributed in any manner to UNDP, or the UNEP Risø Centre or Det Norsk Veritas.

Acknowledgments

This publication is partly financed by United Nations Development Programme (UNDP)'s Carbon 2012 Project co-financed by the Government of Spain, as part of the special cooperation agreement between UNDP and the UNEP Risø Centre.



*Empowered lives.
Resilient nations.*

The UNEP Risø Centre would like to express gratitude to **Mark Trexler** (DNV); **Mateo Salomon** and **Carlos Salgado** (UNDP); and **Xianli Zhu**, **Daniel Puig** and **Surabhi Goswami** (UNEP Risø Centre) for providing insightful comments and review to preliminary versions of this publication.

Table of Contents

Foreword	5
1 Introduction	6
2 MRV systems	7
3 Current MRV frameworks for Greenhouse Gas Emission	10
3.1 Implementation of MRV routines	10
Measurement	10
Reporting	12
Verification	12
3.2 Governance of MRV systems	12
Laws and regulations	12
Authorities, Responsibilities & Accreditation	13
Issuance and Compliance	13
Penalties	13
3.3 Key elements for MRV frameworks	15
4 MRV Elements for NAMAs	16
4.1 Scope - project, programme and policy boundaries	16
4.2 Baselines	16
4.3 Measurement	17
4.3.1 Quantitative and Qualitative Metrics	18
Quantitative Financial Metrics	18
Quantitative Process Metrics	19
Quantitative Technical Metrics	19
4.3.2 Advantages and Disadvantages	19
4.4 Reporting and Oversight	19
4.5 Verification at the national level	22
4.5.1 Accreditation	22
4.6 Registry, Issuance and Compliance	23
4.7 Minimum MRV system requirement for NAMAs	24
5 Developing Country Capacities and Capabilities for MRV Implementation	26
5.1 Types of NAMAs, levels of capacity, and elements of an MRV system	28
6 The way forward in designing a rigorous MRV system	30

Foreword

The requirements for measurement, reporting and verification (MRV) of nationally appropriate mitigation actions (NAMAs) are one of the crucial topics on the agenda of international negotiations to address climate change mitigation. According to agreements so far, the general guidelines for domestic MRV are to be developed by Subsidiary Body for Scientific and Technological Advice (SBSTA)¹. Further, the Subsidiary Body for Implementation (SBI) will be conducting international consultations and analysis (ICA) of biennial update reports (BUR) to improve transparency of mitigation actions, which should be measured, reported and verified².

What is clear from undergoing discussions both at SBSTA and at SBI is that MRV for NAMAs should not be a burden for controlling greenhouse gas (GHG) emissions connected to economic activities. Instead, the MRV process should facilitate mitigation actions; encourage the redirection of investments and address concerns regarding carbon content of emission intensive operations of private and public companies and enterprises worldwide.

While MRV requirements are being shaped within the Convention, there are a number of initiatives supporting developing countries moving forward with NAMA development and demonstration activities. How these actions shall be measured, reported and verified, however, remain unanswered.

MRV is not new. It is present in most existing policies and frameworks related to climate change mitigation. With an aim to contribute to international debate and capacity building on this crucial issue, the UNEP Risø Centre in cooperation with UNDP, are pleased to present this publication that through the direct collaboration with Det Norske Veritas (DNV) builds on existing MRV practices in current carbon markets; provides insights on how MRV for NAMAs can be performed and identifies elements and drivers to be considered when designing adequate MRV systems for NAMAs in developing countries.

This primer is the second contribution in the emerging area of NAMAs and MRV. It is complemented by a recent publication on Low Carbon Development Strategies and NAMAs.

Comments and feedback are most welcome to:
milh@dtu.dk

Miriam Hinostroza

Head of Programme
Energy and Carbon Finance, UNEP Risø Centre

¹ According to paragraph 37 of the decisions adopted by the Conference of the Parties (FCCC/CP/2011/9/Add.1); it "...requests the Subsidiary Body for Scientific and Technological Advice to develop general guidelines for domestic Measurement, Reporting and Verification of domestically-supported nationally appropriate mitigation actions.

² Annex IV. Modalities and guidelines for international consultation and analysis: 3. The ICA process will consist of "... A technical analysis of the biennial update reports submitted by Parties not included in Annex I to the Convention either, as a summary of parts of their national communication in the year in which the national communication is presented or as a standalone update report, by a team of technical experts in consultation with the Party, and will result in a summary report. The information considered should include the national greenhouse gas inventory report, information on mitigation actions, including a description of such actions, an analysis of their impacts and the associated methodologies and assumptions, the progress made in their implementation and information on domestic measurement, reporting and verification, and on support received.

1. Introduction

Nationally Appropriate Mitigation Action (NAMA) is increasingly becoming one of the fundamental concepts for promoting social, economic and environmental transformations in pursuit of *low emission development*³. A number of initiatives have emerged for testing NAMAs through different approaches and several countries have made their first submissions to the UNFCCC reflecting initial thinking about NAMAs. Likewise, initiatives piloting NAMAs in different areas are growing among developing countries through the support of multiple donor agencies. Promoting NAMAs implies a process with multiple challenges, not only financially and technologically, but also more subtle issues like vested interests. However, if striking the right formula, it holds opportunities for unleashing new flows of finance from both public and private sources.

One of the main challenges when implementing NAMAs is the requirement for Measuring, Reporting and Verifying (MRV) in ways that are consistent, transparent, comparable, complete and accurate. Putting MRV systems in place with a sufficient level of rigorousness and harmonized with national circumstances and development priorities needs innovative thinking. More importantly, it needs the provision of official international guidance, which is currently under development, and extensive support for capacity building.

The international guidance is gradually accruing, recently through decisions made at COP17 in Durban. Here, it was decided that the scope of information to be provided in developing countries' Biennial Update Reports (BUR), as adopted in Durban, includes not only a national inventory of anthropogenic emissions by sources⁴, but also a national inventory report and information on "mitigation actions". The information contained in these BURs will be subject to an international consultation and analysis (ICA) process. It was further decided in Durban that NAMAs for which international support is sought may be submitted to a UNFCCC Registry and that information required for NAMAs is similar to that provided on "mitigation actions" in BURs.

While the Parties to the UNFCCC work on such guidance for MRV and clarify the policy logic behind it, the UNEP Risø Centre and Det Norske Veritas (DNV) have joined forces, through funding made available by the UNDP's Carbon 2012 project, to develop this publication with the objective of contributing to the international debate and supporting early capacity building activities for both NAMAs and MRV.

This Primer takes note of the important decisions made in Durban. Further, it assumes that MRV provisions ultimately will build on existing experience from emissions reduction efforts, including MRV practices of CDM projects and programmes, and procedures to quantify and account for emission reductions under carbon offset schemes.

³ Low Emission Development (LED), Low Emission Development Strategies (LEDS) and Low Carbon Development Strategies (LCDS) are used interchangeably throughout the publication

⁴ as well as removal by sinks of all greenhouse gases (GHGs) not controlled by the Montreal Protocol

2. MRV systems

Measurement, Reporting and Verification (MRV) has taken an increasingly prominent role in climate change negotiations. MRV frameworks provide assurance to stakeholders that projects and programmes meet clear standards; that their implementation is carefully monitored, and that progress is reported and the results verified.

MRV is widely used in many contexts, with many different purposes, practices and interpretations. It is also a fundamental element of governance throughout history, not least in production based tax systems for instance for agriculture. In more recent history, different MRV approaches have been adopted in international treaties such as Whaling Convention, the Strategic Arms Limitation Treaty and the Montreal Protocol, or in institutions like the International Atomic Energy Agency. Probably the most directly relevant source of experience is the Clean Development Mechanism (CDM) where MRV confirms compliance to a standard (the methodology) and provides assurance that the CDM project offset requirements have been met, in which case CERs can be issued. The common aspect in all these international initiatives is that they define an objective, a baseline or base case from which a deviation is desirable, a measurement system, a reporting system and a verification system. The overall design, however, differs from case to case.

MRV systems are, therefore, commonplace and there is plenty of experience to learn from. NAMAs reflect a global objective of emissions reduction and represent not only a platform for national mitigation action, but also actions that are collaborative efforts between developing and developed countries. Such collaboration may take many forms, some of which may find inspiration in current frameworks for development cooperation. Traditional development assistance has over the years developed from stand-alone projects to include programmes, sector-wide approaches and budget support. In this transition there has been particular focus on MRV, reflecting a general concern with aid effectiveness in development cooperation. Principles for national ownership and mutual accountability for results are agreed in the Paris Declaration 2005 and the follow up Accra Agenda for Action 2008 signed by developed and developing country governments and multilateral institutions.

When considering MRV systems for NAMAs, these declarations eventually become relevant. This includes the realization that a country's readiness to receive general or targeted sector budget support generally depends on the existence of: 1) a national policy and strategy for development priorities in relevant sectors, 2) a stable macro-economic framework and 3) a public financial management system so as to justify the external budget support⁵.

A partner country's capacity to measure and report on performance criteria and indicators is important, as these become the focus of subsequent dialogue on progress and results, but no widely recognized standard methodology exists for the evaluation of budget support, including sector wide approaches. A commonly used framework has been developed by the OECD/DAC using logical framework terminology (input, output, outcome and impact) and standard evaluation criteria such as relevance, efficiency, effectiveness, sustainability and impact⁶. For joint evaluations it is important to have a dialogue on the choice of methodology and a common understanding of the terminology used.

In many cases MRV systems are based on a standard set by a standard setting body such as the International Standard Organization (ISO). In such cases the purpose of the MRV system is to ensure compliance with the standard which needs to reflect the specific objective of the programme or policy for which it has been established. In the case of NAMAs, a standard could provide requirements for measuring both emissions reduction as well as environmental sustainability of a given activity.

To ensure the compliance with a given standard (or objective), measurement of performance is necessary, i.e. the 'M' in MRV. In the current context 'measurement' is often used interchangeably with 'monitoring'. The two are not the same, however, and are not equally feasible in all contexts. In simple terms, all that can be measured can also be monitored; but not all that is monitored can be necessarily measured quantitatively. As the original

5 EC (2007). Aid Delivery Methods. Guidelines on the Programming, Design and Management of General Budget Support. Tools and Methods Series, European Commission. 1.

6 DAC, D. A. C. (2002). Glossary of Key Terms in Evaluation and Results Based Management, OECD: 40.

texts in the climate negotiations speak of ‘measurement’, this term is used throughout this Primer.

2.1 MRV for Nationally Appropriate Mitigation Actions

The term ‘NAMAs’ originates in the Bali Action Plan (CP.13, 2007) defining the concept as ‘nationally appropriate mitigation actions by developing country parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building.’ However, the international climate change negotiations are yet to produce a final definition and *modus operandi* for NAMAs. This has left the scene open to stakeholders to the negotiation process to structure and define NAMAs through projects and concepts. It is understood from the Cancun negotiation texts⁷, though, that differentiation is made between supported and unilateral NAMAs:

1. Unilateral NAMAs – autonomous actions taken by developing countries to reduce domestic GHGs (domestically funded and unilaterally implemented)
2. Supported NAMAs – actions undertaken with financial, technological and/or capacity building support from developed countries

These two definitions are founded in negotiation texts adopted by the COP and form the basis for the structures that are being developed around NAMAs. However, it is not evident from the negotiation texts – and it has indeed been rejected by some Parties – that the NAMAs can form the future basis for a carbon market. Many market actors, however, have proposed to add to the ‘NAMA typology’ a third type, namely

3. Credit-Generating NAMAs (or new mechanism) – actions that produce credits for sale in the global carbon market. This category is currently not part of official negotiations.

The third type is obviously closely linked to current experiences with the CDM and is discussed more in the context of ‘new market mechanisms’. It has been included in this Primer as a NAMA category, not as a policy statement, but for the purpose of sharing existing experience and deliberations on how the principles of MRV of a market based mechanism can be carried over to a NAMA framework.

NAMAs should originate in general national development planning processes and the national appropriateness of mitigation actions flows implicitly from there.

UNEP Risø published a Primer for COP17 that links the NAMAs to Low Carbon Development Strategies⁸ (LCDS). LCDS are economy-wide exercises that map out reduction options within the framework of current development objectives and priorities, practically identifying areas where a shift in priorities or a shift in technology can bring about emissions reduction without jeopardizing overall long term development objectives. The result could be

1. a list of projects and programmes that are prioritized based on mitigation assessments
2. a strategy for financing
3. a definition of the institutional framework and
4. the outline of national policies to achieve such development at the national level.

Hence, the LEDS entails the development of a strategic framework for the implementation of prioritized reduction options. This realization may be helpful for developing country Parties’ response to the invitation extended by COP17 to submit more information relating to nationally appropriate mitigation actions, including underlying assumptions and methodologies, sectors and gases covered, global warming potential values used, support needs for implementation of nationally appropriate mitigation actions and estimated mitigation outcomes.

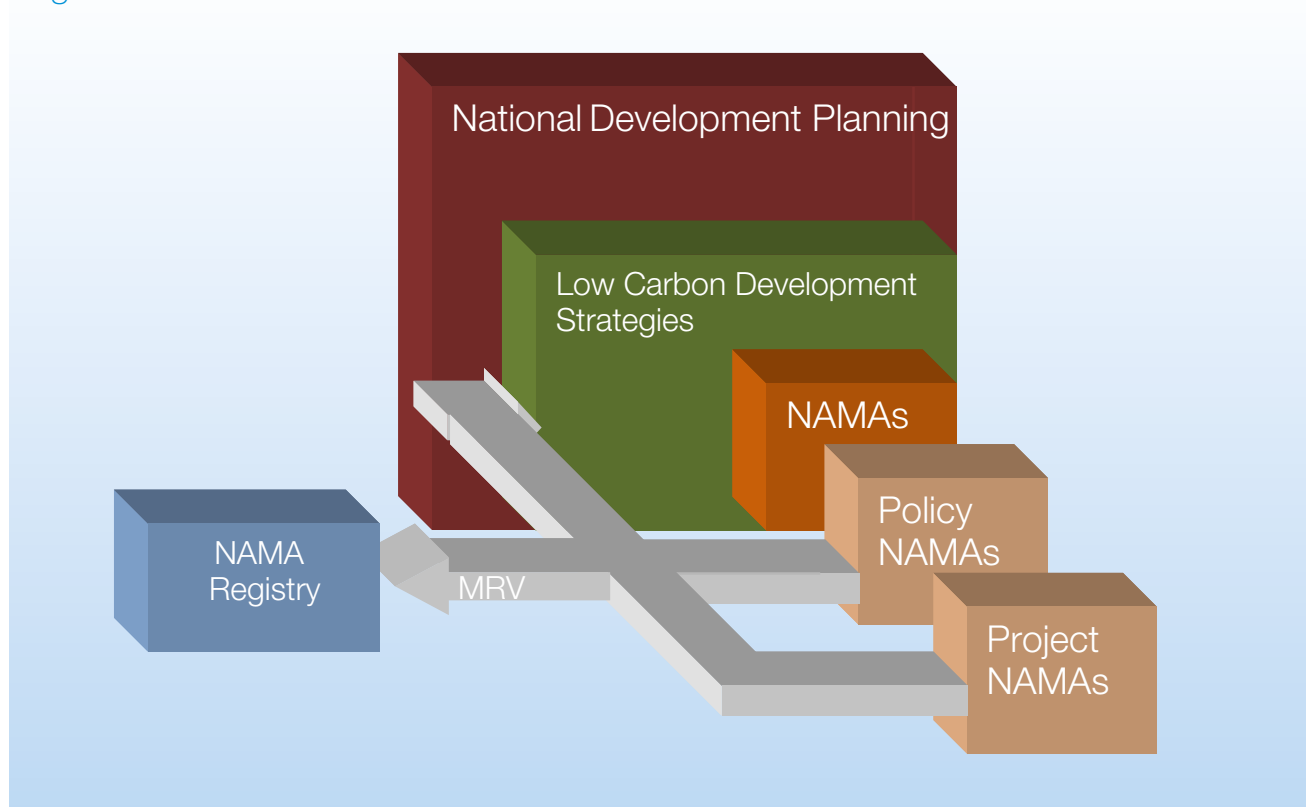
NAMAs may be divided into policy NAMAs and project NAMAs (see Figure 1). Project NAMAs are most likely to resemble CDM activities or Programmes of Activities (PoAs) in cases where large numbers of smaller installations comprise relevant mitigation responses. It may be expected, though, that NAMAs probably rarely will entail stand-alone activities as long as CDM continues in parallel. Instead, emerging from more strategic planning processes, NAMAs will most likely represent concerted actions that include several different but interlinked mitigation activities and many different sources of funding.

It will be the task of the MRV system to keep track of the overall performance of the NAMAs. As the MRV system must reflect the objective of the activity that is to be documented, it is very important to understand the differences between the NAMA types and how this may impact on the design of the MRV system. The next chapter discusses lessons learnt from MRV frameworks of existing emission reduction regimes. This will be used to define some key MRV elements that can be applied to the design of MRV frameworks for different NAMAs.

7 e.g. FCCC/AWGLCA/2010/8

8 Low Carbon Development Strategies – A Primer on Framing Nationally Appropriate Mitigation Actions in Developing Countries

Figure 1: NAMAs in the context of LCDS



3. Current MRV frameworks for greenhouse gas emission

As discussed in Chapter 2 MRV systems are commonplace throughout economy and policy sectors of activity. MRV systems are used extensively in a number of mechanisms and trading schemes for greenhouse gas emissions reductions worldwide. The most common ones are listed in Table 1. These programmes measure and assess the emissions of individual installations or actions/projects and are a product of processes in which political decisions have been made to form the framework of both the mitigation programme and the MRV system.

Any MRV framework must carefully define its boundaries, objectives and incentives for implementation. A prime focus in MRV frameworks is the role and necessary actions of those responsible for the Monitoring, the Reporting as well as the Verification. However, this cannot be determined without a clear definition of the scope of the activity that needs to be monitored and ultimately verified. The scope of CDM, for example, is to generate real verifiable reductions in emissions of the 6 Kyoto Protocol gasses compared to a Business as Usual (BaU) scenario while contributing to sustainable development. The scope of the EU ETS, on the other hand, is to ensure the tradability of CO₂ emission allowances in a defined number of installations within the European Community. Although both scopes require the monitoring of emissions, there is a considerable difference in the actual monitoring and reporting functions, and the information that need to be verified.

In the EU ETS, which is a cap and trade system, the installation will have to monitor and record the total amount of CO₂ emitted at the end of the calendar year and ensure that the emissions are within their permitted levels (allowance held). The GHG emitting entity is free

to determine how it achieves this. For instance, it can redesign its installation, have shorter working hours or change the fuel used.

A CDM project, on the other hand, which is based on an offset system, will first need to define what action it will implement to achieve the emission reduction (project activity), then demonstrate that the project activity is additional and that it contributes to sustainable development and finally determine the emissions reduction at the end of a monitoring period. It has no freedom to choose how it achieves its emissions reduction and must follow the monitoring plan established in the Project Design Document (PDD) to the letter.

In the case of a mitigation policy or an incentive programme, the participant may only have to demonstrate its willingness to use a certain low carbon technology or energy efficient practice. No actual accounting of emissions reduction is undertaken. Instead, an approximate level of emissions reduction achieved through the initiative can be estimated.

3.1 Implementation of MRV routines

Implementation of the MRV framework involves the measuring, reporting and verification of emissions reductions – or other programme objectives as the case may be. For instance in the CDM, additional objectives serving the promotion of sustainable development are included, though in this case no MRV system to account for the sustainability promotion effect of CDM activities has been introduced.

Measurement

Measurement is the first essential element in an overall assessment of the efficiency in implementing any

Table 1: Emission Mitigation Systems

Trading Schemes	Standard	Scope	Jurisdiction of operations	Legal Framework
Australian Clean Energy Act 2011 and National Greenhouse and Energy Reporting Act	National Greenhouse and Energy Reporting (Measurement) Determination 2008 and associated NGER Technical Guidelines	Reduction of 6 GHG Kyoto Protocol Gases emitted from the stationary energy, industrial processing, resources and waste sectors.	All States and Territories in Australia including external Territories and Australia's exclusive economic zone.	Commonwealth Law
1990 Clean Air Act (Acid Rain Programme)	Actual measured emission levels	SO ₂ & NO _x emissions	Federal Government USA (All States of USA)	Federal Law
California Climate AB32	Reporting Protocols	Reduction of 6 GHG Kyoto Protocol Gases	State of California	State Law
Clean Development Mechanism	Project Activity specific Methodology	Reduction of 6 Kyoto Protocol Greenhouse Gases Contribution to sustainable development	All non-Annex I countries that ratified the Kyoto Protocol	International Treaty
European Union Emission Trading Scheme (EU ETS)	Installation specific monitoring protocol	Reduction of CO ₂ emissions of a defined number of sectors and sizes of installations (As of 2013, scope is extended to include also N ₂ O)	All member states of the European Community	EU Directive – operationalized into national legislation
South Korean Emission Trading Scheme (Korean ETS)	CDM Methodology & local developed Technology Methodologies	Reduction of 6 GHG Kyoto Protocol Gases	South Korea	National Legislation
Western Climate Initiative (WCI)	Reporting Protocols	Reduction of 6 GHG Kyoto Protocol Gases	7 states of the United States and 4 states of Canada	State Law

mitigation action. It consists of the collection of essential data needed to conduct reporting and ultimately, verification. What is required for measurement entirely depends on the ultimate claims that are to be made as part of the mitigation programme. Although, generally, monitoring will be associated with the measuring of emissions, there are also other elements that may require monitoring. Under the CDM, a variety of monitoring can exist within one mitigation programme, while under the Acid Rain programme the monitoring is limited to the actual emissions at the smokestack.

The wider the scope of the mitigation programmes, the more flexible the monitoring requirements have to be.

The Acid Rain Programme is relatively simplistic in its monitoring as it only considers a restricted sector with a relatively easily measurable gas. The CDM, however, with its 15 different sectoral scopes will have to adopt monitoring requirements that suit each of the sectors. This also requires access to a significantly larger number of specialists in order to determine whether the monitoring requirements are able to provide the information needed to measure the emissions. Designers of mitigation schemes such as AB 32 and WCI (see Table 1) have spent considerable time prior to the launch of the programmes to develop monitoring protocols and only expand their scope of applicability once a new monitoring protocol is developed. Other schemes such

as the Korean ETS, addresses this need for development of monitoring requirements by using the methodologies of the CDM EB.

Reporting

In current emissions reduction activities, reporting focuses on the specific installations under scrutiny and the emission sources and gases of the project activity. Reporting can generally be divided into

- » Direct emissions reporting; and
- » Indirect emissions reporting.

Under direct emissions reporting, the installation is generally required to install meters that automatically report directly into a dedicated database, hence an automated, electronic system. The indirect emissions reporting normally rely on the manual registration and calculation of emissions which are then verified before being registered as final emissions data. Direct emission reporting offers the advantage of complete, accurate and real time data to the government. This means that the need for specialized Measurement and Reporting expertise at the installation level is either eliminated or kept at a minimum. On the other hand, experience shows that although meters are installed and function correctly, all emission sources are not always identified and metered by the installation which results in incomplete emissions reporting. This incompleteness can sometimes be explained by rigid reporting requirements that do not always fit with the individual installation's method of operation.

Indirect emissions reporting, such as in the CDM and the EU ETS, allows flexibility between the different installations since they can normally introduce local variations in how they obtain the relevant data. This system is quite demanding on the installations and requires specialized experience and competence in order to work effectively. This is particularly true when the installation has to interpret a methodology in order to be in compliance with its monitoring and reporting requirements. As a consequence, an MRV system that relies on indirect emissions reporting normally requires a considerable amount of supportive documentation to assist the installation in undertaking the monitoring and reporting as well as the verifier in performing the verification.

Verification

In many of the climate change mitigation programmes, the MRV frameworks use external independent verification (third party) to confirm that the monitoring and reporting is in line with the requirements. In the schemes in New Zealand, Australia and the US, however, verification is either done by the company itself (2nd and 1st

party verification) or by government inspectors. Although the latter can generally be seen as another form of 3rd party verification, the former is often used where there are strong national criminal prosecution laws. For example, first party verification in the US, where the company or CEO of the company states that it has verified the data and considers them in compliance, is often effective enough as the respective environmental legislation can make the CEOs personally liable for any misstatements about the company's environmental compliance. In countries where CEOs cannot be made personally liable for a company's environmental performance, this structure is not feasible.

The verification, like monitoring, needs to be clearly defined and in line with the objectives of the mitigation programme. If the aim of the verification is to determine that the information in the monitoring system and reporting is "adequate", it will not be possible to obtain any value out of the verification in relation to the company's compliance with legal requirements. For example, although one of the objectives of CDM is the contribution to sustainable development the only assessment made is at the time of project validation. Consequently, once the project is registered and implemented, there is no option of making any statement concerning the project's actual contribution to sustainable development as no parameters to assess that effect are being measured and verified, unless this is voluntarily included in the monitoring plan.

3.2 Governance of MRV systems

The differences in scope and approach for emissions reduction related programmes are a result of local framework conditions and local government priorities and principles for implementation as well as local or international laws and regulations that stipulate authorities, responsibilities and accreditations.

Laws and regulations

Each country has its own way of formulating legislation and this has implication for the way in which climate change mitigation programmes are designed and how their MRV structures are implemented. There is a large variety in legal governance among the national and international programmes listed in Table 1, including differences in legislative bodies and legislation levels. The table lists the jurisdictions of the different programmes and the legal frameworks that range from the regional State Level (e.g. AB32, WCI) to the international level (e.g. CDM).

Each of the programmes have their own legal framework which regulates the operationalization and control of the

programme and its ability to interact with other mitigation programmes (e.g. EU ETS accepting CDM EB and AB 32 accepting offsets from WCI). While regional legislation (AB32, WCI) and national legislation (Korean ETS) may have more control and direct enforcement power, multi-national (EU ETS) or international (CDM) legislation have a more common application and enshrine an overall commitment from participating governments.

Embedding MRV in legislation necessitate the consideration of a number of key elements that have direct impact on the effectiveness of the MRV system. The legislation will need to cover:

- » Authorities – which organisation is the authority and what does the authority entail?
- » Responsibilities – which organisation is responsible for implementing which parts of the legislation / programme?
- » Accreditation – which organisation awards accreditation to third parties, if such parties are necessary for the functioning of the system, and what needs to be demonstrated in order to achieve accreditation?
- » Compliance – which organisation will endorse the compliance with the requirements?
- » Reporting deadlines – at what date or at which frequency does the reporting have to be submitted and/or verified?
- » Issuance – which organisation issues proof of compliance or allowances or credits, as the case may be?
- » Penalties – what are the consequences in cases of non-compliance?

Authorities, Responsibilities & Accreditation

Ensuring proper authorisations and delegation of responsibilities are important elements in the governance of any scheme. If defined properly, this will avoid blockage in the MRV system and ensure its effective and transparent operation. Many implementation problems for the CDM have been attributed to the lack of clear authorisation and allocation of responsibilities. In the Kyoto Protocol and the Marrakesh Accord accredited DOEs were assigned to be the extended arm of the CDM Executive Board (EB) and to validate and verify CDM projects, but in order to oversee the work of the project participants and the DOEs the CDM EB initiated a high level of project re-assessments (e.g. introduced the registration issuance team, completeness checks and performance assessments) which became a bottleneck in the process.

As part of the governance of the MRV framework, it is important to provide clear direction on the qualifica-

tions required to perform the measuring, reporting and verification. In those schemes that require accreditation of third parties to perform the verification, the accreditation process ensures that the competence requirements are met. The person or organisation to be accredited has to demonstrate their competence in assessing the implementation of the measurement requirements and the reported data.

In the EU ETS, there are a number of different ways in which entities or individuals can be accredited. Although most countries use their National Accreditation Bodies to accredit entities, some countries rely on accreditation of individuals that is obtained through an examination at a dedicated recognised institution.

The advantage of a centralised accreditation approach, as adopted under the CDM, is that entities accredited have a common standard or level of competence. The decentralised accreditation model of the EU ETS has resulted in a complex maze of different accreditation types which makes it harder to understand who can do what in which sector or country and what level of competence is required to perform the verification services.

Issuance and Compliance

Once the verification of the monitoring and reporting activities is complete, an assessment of whether the project or installation has met the compliance criteria can be performed. The next step is to officially confirm this compliance. For example, in the case of CDM, a request of issuance can be submitted to the CDM EB while in the EU ETS the verification statement allows the installation to upload its allowance compliance account. Most programmes clearly separate the role of verification of the emission with the actual issuance of the emission reduction (e.g. CERs by CDM EB and Verification by DOEs or compliance with maximum emission levels by Competent Authority of the EU Member State and Verification by EU ETS Verifier). This is partly done to allow for additional checking. Further, as the units that are being issued or surrendered are considered government property, they should not be issued or governed by the private sector. However, there are also cases in environmental legislation where the verification body is responsible for overseeing compliance with regulations.

Penalties

In order to have an effective MRV system that is taken seriously by all stakeholders, each of the climate change programmes have a penalties component. The penalties are issued when the implementing entity does not follow the rules of the programme and as such has

failed its MRV. In some climate change programmes the implementing entity will have to pay a penalty fee for not complying with the requirements of the programme (e.g. EU ETS, AUS ETS, Acid Rain Programme etc) while in other cases the penalty results in a reduced number of offsets being issued (e.g. CDM). In both cases the company operating the emissions reduction facility will have failed to follow the measurement and reporting requirements of the specific regulatory system.

In cap&trade programmes the implementing entity is also often penalised by raising its emissions reduction targets for the monitoring period(s) following the period

in which a non-compliance was observed – in addition to monetary penalties. In those cases, any shortfall in the original reporting period will have to be made good in the next reporting period in addition to its normal reduction target (EU ETS).

The penalty system will normally allow the penalised entity to seek recourse on decisions that they believe are incorrect. As such the penalty system and the levels of the penalties are well defined within the MRV part of the legislation, as most systems rely on the national court system to settle any disputes in relation to a) the level of the penalty and b) the actual validity of the penalty.

Table 2: Basic elements of MRV system

MRV Elements	Different types and options
Scope	<ul style="list-style-type: none"> • Cap & Trade • Offsets • Incentive Programme (Policy)
Programme Oversight Appeals / Legislative	<ul style="list-style-type: none"> • National Accreditation Body • Government Department • International Body • International Body
Issuance and Compliance Body	<ul style="list-style-type: none"> • Government Body • Third Party • Second Party • First Party • Domestic Standard
Standards	<ul style="list-style-type: none"> • ISO Standard • International Recognised Standard (UNFCCC, IPCC, CDM EB, etc.) • Bilateral Standard
Verification (Control Entity and qualifications)	<ul style="list-style-type: none"> • Government Department • Third Party • Second Party • First Party
Monitoring & Reporting	<ul style="list-style-type: none"> • Publically available
MRV Reporting at National Level	<ul style="list-style-type: none"> • Publically available in aggregate basis (UN national inventory basis) • Publically available on participant basis (registry) • Internally available • National Legislation • International Body • Control Entity

3.3 Key elements for MRV frameworks

The above discussion has focused on some of the key elements in the MRV frameworks in current climate mitigation programmes. It has highlighted the importance of clearly defining the scope of the programmes, the impact of different legislative frameworks underpinning the programme and the different forms of governance. Further, it has briefly discussed the implementation of

programmes with respect to MRV and compliance conditions. A summary of these elements and their different types is given in Table 2.

As an example, the table below applies the main MRV elements to the EU ETS and CDM. This illustrates how differently the programmes are designed and how this impacts on the MRV framework as a whole.

Table 3: MRV Elements for EU ETS and CDM

MRV Elements	Different types and options	CDM
Scope	<ul style="list-style-type: none"> CO2 emissions N2O emissions (from 1/1/2013) Specified Installations 	<ul style="list-style-type: none"> 6 Kyoto Protocol Gases
Programme Oversight	<ul style="list-style-type: none"> EU Commission with National government transition into local legislation 	<ul style="list-style-type: none"> COP/MOP CDM EB
Appeals	<ul style="list-style-type: none"> European Court National Courts 	<ul style="list-style-type: none"> CDM EB
Issuance and Compliance Body	<ul style="list-style-type: none"> Competent Authority 	<ul style="list-style-type: none"> CDM EB
Standards	<ul style="list-style-type: none"> EU Directive Installation specific monitoring plan 	<ul style="list-style-type: none"> CDM Modalities & Procedures Project Activity specific approved methodology
Verification (Control Entity and Qualifications)	<ul style="list-style-type: none"> Third Party Entities 	<ul style="list-style-type: none"> Designated Operating Entity
Monitoring & Reporting	<ul style="list-style-type: none"> Individual Installations 	<ul style="list-style-type: none"> Project Proponent implementing the project activity
MRV Reporting at National Level	<ul style="list-style-type: none"> National Registries 	<ul style="list-style-type: none"> Non / CDM Registry

4. MRV elements for NAMAs

As outlined earlier, the array of NAMAs is quite diverse and this will be mirrored in the design of MRV structures for NAMAs. The diversity in the choices of institutional and operational solutions that was described in Chapter 3 can provide inspiration for the design of structures in support of NAMAs, both at the national as well as the international level. So far, only few elements of the institutional structure to support the NAMA/MRV system have been elaborated as part of climate change negotiations, but obviously the MRV structures for the various NAMAs must reflect the set of indicators and metrics that are relevant and applicable for the specific NAMAs. In this chapter, the different MRV elements that were introduced in Chapter 3 will be discussed in relation to NAMAs.

4.1 Scope - project, programme and policy boundaries

It is essential when proposing NAMAs to consider the boundaries of a given initiative, though the diversity of possible NAMAs means that boundary setting may be complex. While some boundaries may be geographical, others might be sectoral, and yet others might be policy related. If such NAMAs overlap, it must be determined to which NAMAs the result of a given action is attributed. This is particularly crucial for supported NAMAs – and indeed for credited NAMAs – as double counting should be avoided. Transparency in measuring and reporting of performance is a first precondition for addressing such issues in setting and observing boundaries. Coordination between institutions responsible for overlapping NAMAs is equally important. Some inspiration for the setting of boundaries may be found in the current CDM methodologies, particularly with relevance to project type NAMAs and for Programmes of Activities. Boundary setting for sectors could equally find inspiration here, while for policy NAMAs a more detailed assessment of expected effects and the attribution of these effects to one or more NAMAs covering the same area of intervention would be required. In those cases, where NAMAs are overlapping, e.g. if in agreement with two different donors both a sector-wide activity as well as a subsector activity is defined, and these are not merged into a single sectorwide NAMA,

the boundaries should generally be established using the same unit, essentially emissions reduction. If not, distinguishing the effect from different NAMAs will be difficult. Many initiatives are likely not to be formulated directly in emissions reduction terms and not immediately possible to translate into tons of CO₂ emissions reduction, for instance. a grant scheme or a labeling initiative. Nevertheless, even approximations will be useful for the determination and allocation of effects of different initiatives to avoid double counting.

4.2 Baselines

Most MRV systems are designed to measure and report against either a standard for compliance, or a baseline. Since the inception of the UNFCCC, the concept of baselines has been central in climate change policy and is used to describe a business as usual development from which a deviation is desired.

Baselines are essential for measuring the success of all GHG policies or programmes, and NAMAs are no exception. The issues associated with the establishment of baselines are beyond the scope of this Primer. In short, while there is no standard definition, a baseline is generally a base case scenario for economic and productive activities and related GHG emissions within a geographical area without GHG mitigation policies or projects. A baseline must be established in order to provide the best possible estimate of real GHG emissions reduction achieved through the implementation of a NAMA compared to the baseline or business as usual scenario.

Baselines may be absolute or relative. For example, indexed baselines could be developed in order to measure the efficacy of a NAMA. The most common type of indexed baselines is an intensity baseline, e.g. GHG emissions per physical sectoral metric (e.g. tonnes of steel) or per unit of GDP for a country baseline. Technology penetration baselines could be used to measure the success of diffusion of technologies into a country as a result of a NAMA (e.g. number of trigeneration units installed against a baseline). An absolute baseline, on the other hand, is the actual emissions during

a specific period by a source regardless of its level of production and/or amount of products produced.

Many countries have submitted voluntary pledges for the Copenhagen Accord in the form of a reduction target compared against a business-as-usual scenario. The Cancun agreement took note of the voluntary pledges submitted to the Accord in the doc FCCC/AW-GLCA/2011/INF.1. At the macro level this corresponds to projecting a probable emission trajectory if no action is taken beyond business as usual, (i.e. the baseline), and then making a pledge for action beyond business as usual that will result in a reduction of GHG emissions. If projections are the result of sectoral assessments and not less specific extrapolations of economic growth and emission intensity expectations, they could constitute baselines against which sector initiatives could be measured. The point of departure for such baselines is an inventory of emissions, such as already provided through the national Climate Change Communications, and such as is expected in future biennial reporting, though an entire inventory of all emissions in all sectors is of course not necessary if only emissions reduction in one or a few sectors are proposed. Here, a sectoral inventory and baseline is sufficient.

Countries should seek to establish or develop sectoral baseline inventories at the national level if they pursue support, possibly crediting, for sectoral initiatives. But baselines may equally be useful for unilateral initiatives, e.g. if domestic emission trading systems are considered⁹. Establishing sectoral baselines are not without challenges. For instance, in countries with different types of NAMAs the effective implementation of one NAMA may impact on the baseline of other NAMAs. For example, measurement of the efficacy of a NAMA to promote the uptake of energy efficient household appliances (the efficacy measured in emissions reduction terms as opposed to quantitative uptake) could be compromised by a successful NAMA to increase the contribution of renewable energy to the grid. If the grid emission factor decreases (by replacing fossil fuel based power with renewable sources), the amount of emissions reduction per efficient unit of household equipment is less – but of course the final outcome would still be positive.

4.3 Measurement

Having established a baseline from which the NAMA has the objective to deviate, and having delineated the NAMA boundaries, the affiliated MRV systems will be measuring, reporting and verifying data that are collected and kept according to procedures agreed. Such procedures may have been agreed either at the international level through the UNFCCC or at the bilateral or national level for a specific NAMA coordinated by, for example, a Central Coordinating Unit. A Central Coordinating Unit (CCU) is thought to be a necessary national institution or function to align all emissions reduction related sector strategies and initiatives and bring them forward for national and, essentially, international financing. For further discussion of the CCU, see section 4.4 on Programme Oversight.

For all NAMA types the data collection and evaluation processes should be transparent and traceable. Data collection systems which are transferable across NAMA types and sectors will need to be established as an integrated part of NAMA design and implementation.

Establishment of effective MRV frameworks for NAMAs means putting into place practical and achievable frameworks for measurement, reporting and verification while maintaining the high standards necessary for ensuring real mitigation. Measurement is a prerequisite for verification. Measurement requires a measurable unit to be identified and recorded, and those records made available for verification through reporting systems. In the following, various measurable parameters are presented. These can be drawn upon for unilateral and supported NAMAs as well as, potentially, credited NAMAs. While GHG reduction benefits can be relatively easily quantified for NAMAs with easily measurable emissions reductions, quantification will be more difficult for many policy-related NAMAs. It can be difficult to establish traditional GHG emissions reduction related indicators for policy based NAMAs as the direct causal links between the policies and the resulting emissions reduction are not always clear. Hence different sets of indicators and metrics must be considered to be able to monitor their effects or whether objectives are met.

A measure of caution should also be added, though. NAMAs may well be defined for entire sectors and consist of a number of measures, some of which are not necessarily measurable neither in financial nor in emission terms. If the entire sector has been benchmarked and emissions are reduced comparably, there is no need to attribute the parts of the reduction to specific initiatives, as long as the overall objective has been achieved. The only reason why such possible bound-

⁹ see Wolfgang Sterk & Florian Mersmann "Domestic Emission Trading Systems in Developing Countries: State of Play and Future Prospects", Wuppertal Institute 2011, where six developing countries with possible domestic ETS are analysed: Brazil, China, India, Kazakhstan, Mexico and South Korea

any drawing may be required is if individual sources of funding for individual parts of the entire set of measures wish to see the result of their specific contribution. In these cases, a collusion of financial sources should be encouraged so as to reflect the structure and nature (in this case a sector-wide initiative) of the NAMA.

4.3.1 Quantitative and Qualitative Metrics

Metrics effectively fall under two primary categories: quantitative and qualitative metrics. Quantitative metrics are metrics for variables which can be measured using standard units of measurement and may include financial, technical and process data, while qualitative metrics are for variables which cannot be measured using standard units of measurement and may include financial, technical and process data. In addition, metrics can be categorized as inputs acting towards GHG mitigation or the outputs of mitigation activities in terms of real measurable GHG reductions. For example, input metrics might include the number of activities established, units constructed, programmes implemented or funds disbursed in an effort to reduce greenhouse gas emissions. Output metrics refer instead to the causal relationship between an action and the actual GHG reduction, e.g., the amount of diesel fuel replaced by natural gas in a public transport NAMA, from which it is possible to calculate actual GHG emission reductions. The range of metrics applied to a NAMA could include quantitative and qualitative as well as input and output metric types. Metrics may include data from both donor and host countries.

Quantitative Financial Metrics

Financial metrics include the financial flows from donor to recipient institutions and from those institutions to funded activities and operations. Their usefulness in

respect of NAMAs is primarily to ensure the efficacy of funds in conjunction with one or more supplemental metrics. On their own, therefore, financial metrics are unlikely to demonstrate real reductions in emissions, but will form part of a mix of metrics useful for assessing the performance of supported NAMAs. In particular, these metrics will allow for assessment of such aspects as the cost effectiveness of NAMA activities and the financial flow of climate finance to developing countries. Funding through the prospective Green Climate Fund or the Global Environmental Facility is likely to be much more easily accounted for at the international level, while funding provided through bilateral channels may be more difficult to measure and verify. Funding institutions may choose to carry out their own auditing of funding flows and there may be an opportunity to rely upon some of the new climate fund standards that have been developed such as the Climate Bond Standard developed by the Climate Bond Initiative¹⁰. The outcomes of third party MRV related to those standards could potentially be incorporated at the international level.

Although measurement of financial metrics is relatively straight forward from a technical perspective, there is a need to ensure that robust financial accounting systems including data systems and record keeping arrangements for financial and investment flows are in place. Procedures need to be established to ensure that funds are allocated to activities and projects which are included in the particular NAMA. Where there is a need to first put these robust systems in place, it may be necessary to establish qualitative metrics to measure the progress of implementing these systems.

¹⁰ <http://climatebonds.net/>

Table 4: Examples of quantitative and qualitative metrics

Metrics	Examples
Quantitative Financial metrics	<ul style="list-style-type: none"> Funds transferred from donor country Value of a renewable energy asset pool funded through specific donor finance Amount of donor funds spent on a national education programme
Quantitative Process metrics	<ul style="list-style-type: none"> Number of energy efficiency training programmes that have been delivered Number of SMEs that have been provided funding for energy efficiency programmes
Quantitative Technical metrics	<ul style="list-style-type: none"> Number of new trigeneration units installed in a regional grid Emission reductions in that grid compared to the baseline
Qualitative Process metrics	<ul style="list-style-type: none"> Status of establishment of reporting system Status of institutional strengthening programme

Quantitative Process Metrics

Quantitative process metrics include activities which are procedural in nature and can be measured in terms of number of activities completed. Quantitative process metrics are relatively simple to document, record and report, provided that appropriate administrative practices are established to ensure that thorough documentation is kept. Quantitative process metrics are unlikely to require significant capacity building and do not require sophisticated data management systems. They are, therefore, relatively easily implemented. However, like quantitative financial metrics, quantitative process metrics are input metrics and do not provide any indication on their own of NAMA effectiveness or GHG mitigation quantification. Their use is also primarily to ensure the efficacy of processes and programmes in conjunction with one or more additional metrics, and to demonstrate that a NAMA is operating as planned.

Examples of quantitative process metrics include documenting of and reporting on the creation of new institutions or working groups, meetings held or progress in educational programmes.

Quantitative Technical Metrics

Quantitative technical metrics may be input or output based. Input technical metrics are, for example, the capacity of renewable energy installations. Output technical metrics would then be the GHG emissions reduction measured. The MRV frameworks for CDM and JI are well elaborated quantitative output technical metrics.

Technical metrics are the most challenging to document, record and report. Quantitative technical metrics may require significant capacity building and would normally require sophisticated data management systems. Technical metrics may be either input or output metrics, as output metrics they have the capacity to provide the clearest evidence of real GHG reductions. On the other hand, they can be the most costly to measure and verify. They may also exhibit any errors and poor accuracy. Errors and inaccuracy may occur in the instrumental measurement or recording of data, resulting in erroneously reported GHG reductions. This is an important issue where the role of an independent verifier can be critical in ensuring that real GHG reductions are achieved.

Qualitative Metrics

The qualitative metrics can include assessments of the efficacy of activities undertaken which are procedural in nature. Although these are more difficult to document, record and report, they are not likely to require

significant capacity building and do not require sophisticated data management systems. Qualitative metrics will be relatively simple to establish and implement, but will require significant local review and audit processes as part of the MRV process. Like quantitative process metrics, qualitative metrics are input metrics and do not provide any indication on their own of NAMA effectiveness or GHG mitigation quantification. Their use is primarily to ensure the efficacy of processes and programmes in conjunction with one or more other metrics, and to demonstrate that a NAMA is operating as planned.

Examples of qualitative metrics include documenting and reporting on the progress and outcomes of new institutions or working groups, actions implemented from meetings held, and measurable competency improvements as a result of progress in educational programmes.

4.3.2 Advantages and disadvantages

Table 5 summarizes the advantages and disadvantages of the different types of metrics for MRV. In most cases, these metrics are enhanced by applying an integrated approach using a range of metrics. For example, quantitative metrics are most useful in measuring costs and benefits of a particular NAMA when linked to financial metrics.

4.4 Reporting and Oversight

The responsibility for implementation and control of NAMAs will lie with the host country. It will therefore also be the host country that defines authorizations and responsibilities to the institutions working within the NAMA. NAMAs are relevant to a variety of policy areas and sectors, and are likely to be spread over a number of different ministries within the host country, diverse stakeholders, as well as industries with varying MRV experience. Hence, NAMA control structures are equally likely to be anchored in a number of different institutions.

For national NAMA oversight, it will probably be necessary to establish a Central Coordinating Unit (CCU) which can handle the following:

- » incorporate reporting from all line ministries and their regulatory bodies and keep an updated registry of relevant policies and projects
- » report financial flows to policy schemes from both national and international sources (e.g. the Green Climate Fund), including actual disbursements
- » collaborate with the line ministries and record the effects of regulatory initiatives compared to baseline

Table 5: Advantages and disadvantages of different types of metrics

Metric	Advantages	Disadvantages
Quantitative Financial metrics	Information available from donors for cross checking Useful for measuring cost benefit of particular NAMA types in particular countries Relatively easy to establish data and record systems Relatively easy to measure, report and verify Can be verified at international level	Does not directly measure GHG reductions May require reporting systems throughout the NAMA participants
Quantitative Process metrics	Easy to establish data and record systems Easy to measure, report and verify Effective for ensuring activities are progressing	Does not directly measure GHG reductions May require reporting systems throughout the NAMA participants
Quantitative Technical metrics	Useful for measuring cost benefit of particular NAMA types in particular countries Systems are well elaborated in existing UN-FCCC CDM modalities and procedures Panel of independent national/international verifiers (DOEs) established	Relatively difficult to establish data and record systems May require complex inventory systems at the national level Difficult to measure, report and verify Requires in country verification Not applicable for many types of NAMAs
Qualitative metrics	Easy to establish default data and record systems Based on the procedural assumptions Performance relatively easy to measure, report and verify Effective for ensuring activities are progressing	Does not directly measure GHG reductions May require reporting systems throughout the NAMA participants

scenarios (e.g. policy NAMAs that are actions in themselves)

- » oversee the application of relevant methodologies for assessments of emissions reduction from concrete project activities
- » support national and international verification teams
- » devise principles to avoid double counting of emission reduction for related NAMAs
- » build a national emissions inventory system to facilitate biannual update reporting (BUR) to the UNFCCC Secretariat

Structuring a CCU may find some initial basis in the design of Designated National Authorities (DNA), currently serving as national focal points for CDM. Many have board members from all relevant sector ministries, which mirror the diverse areas of intervention for emissions reduction. The CCU would equally have to establish communication links with the UNFCCC Secretariat. Further, the CCUs would benefit from having extensive communication with the private sector for

implementing NAMAs including, probably, a national approval process. However, the NAMAs and the associated MRV systems will require more of the CCU than the current DNAs have been designed for. First and foremost, the CCU may require authority to influence policy development and not only determine project or activities compliance with national priorities. Hence, the CCUs might instead take the form of a 'clearing central' where essential analysis and information is gathered on the coordination and prioritizing of emissions reduction options from different sector ministries – while at the same time retaining current board structures for high level prioritization processes.

There are obvious linkages between the CCU functions and functions of prospective National Climate Funds that are gradually being established, as described by UNDP¹¹: 'By setting in place a process that aligns and

11 Blending Climate Finance Through National Climate Funds A Guidebook for the Design and Establishment of National Funds to Achieve Climate Change Priorities, UNDP 2011 (p.10)

supports existing general goals and strategic programmes, the NCF can provide a coordinated supporting structure to a country's national climate and development priorities. Further, by facilitating regular discussions and stakeholder engagement on national climate issues, an NCF can serve as a central body for discussion and decision-making about how the NCF will support national action.' In many ways the CCU and the NCF can be regarded as identical and should probably not be set up in parallel, but rather as one single institution.

Should there be credited NAMAs, the CCUs (or NCFs) may rely on the already existing functions of the DNA, though it needs to be decided whether issuance of credits should succeed at the national or the international level, or possibly through a two-step process with a national approval first followed by an issuance at the international level. The purpose of a national approval would be to keep control of the prospective national emissions inventory, especially in cases where a national emissions trading scheme is established. The CCU needs to have the capacity to either perform the verification itself or require independent verification of the reductions achieved. Although a trading system could be overseen by the CCU, it would probably not host it. This could, for example, be managed by a line ministry (e.g. for industry or energy). National trading systems could be combined with a national account of surplus credits (measured against a national objective for reductions) held by the CCU for potential international trade in credits.

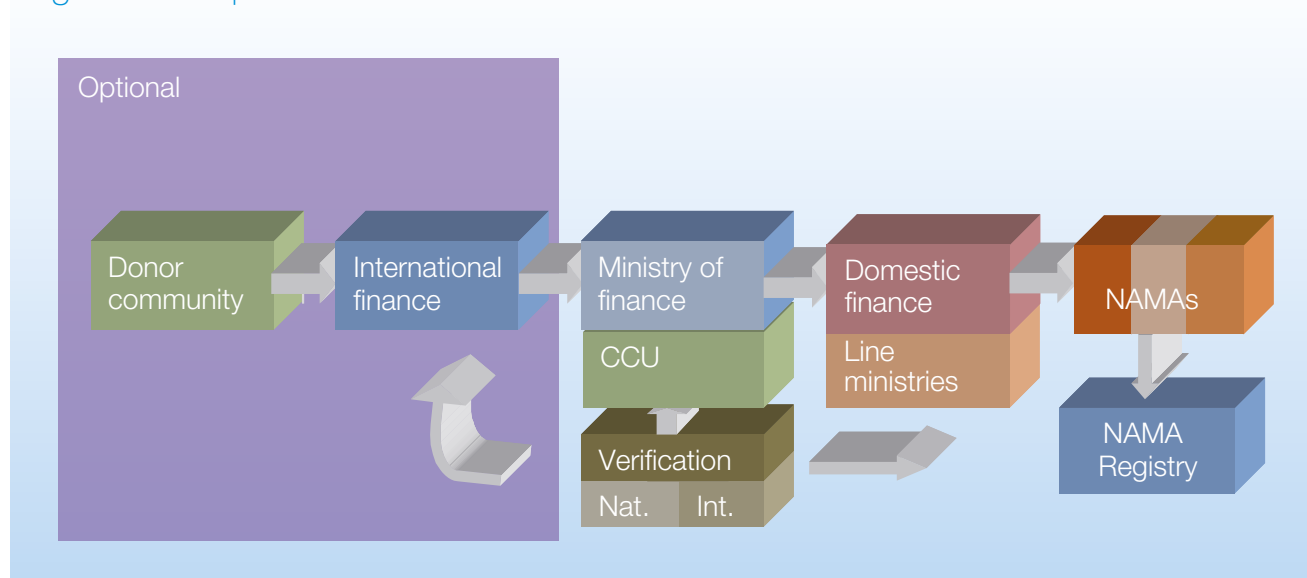
NAMAs shall be based on technology, finance and capacity building. The capacity building is likely to be

part of (additional) development assistance and follow the current means of implementation. The finance and technology platforms for NAMAs, however, are still being formalized. Important steps were taken at COP17 in Durban when a decision was made to establish Climate Technology centres and network during 2012. Further, the Green Climate Fund shall provide financial support over and above direct development assistance. Hence, the CCU must also be able to:

- » keep track of capacity building efforts, domestic (unilateral) as well as international
- » keep track of technology transfer and initiatives of the Climate Technology centers and networks
- » keep track of multilateral and bilateral assistance and finance flowing to the national level
- » Avoid duplication of activities

Figure 2 illustrates the possible programme oversight for NAMAs with the CCU centrally placed close to the Ministry of Finance and in a coordinating role between line ministries, project developers and verifiers. It is maintaining the national registry, reporting to the international NAMA registry, and communicating NAMA proposals and requests for funding. Thus, it will provide information linkages between donor funding, actual disbursement for activities, and emissions reductions achieved – functions that are similar to those proposed for NCF structures. The CCU is likely to be a sizeable set-up though its structure will vary significantly according to national circumstances. The institutional structure may involve line ministries or sector institutions well positioned to extract quantitative information related to the implementation of activities.

Figure 2: Simplistic institutional and functional structure



4.5 Verification at the national level

The structuring of the verification process may include different institutions. The CCU itself may assume the actual verification, which would correspond to second party verification (see Table 6). But systems may even rely on first party verification, where the institution or company responsible for the implementation of a given NAMA undertakes the verification through an internal verification process, e.g. an internal audit. Whichever approach chosen, Parties would need to describe their Quality and Assurance and Control systems that ensure the reliability of performance indicators (e.g. third party review, audit, statistical analysis) and also indicate whether they have any procedures in place for peer or technical review of data, and any provisions for public input and review. Table 6 gives an overview of the different types of control entities that can be used for NAMAs.

The qualifications requirements for different kinds of control entities that are put in place may differ. In the case of first and second party entities, the company which seeks to demonstrate its compliance with the NAMA may determine the qualifications of the staff undertaking the verification. When the government defines certain levels of qualifications for the first and second party entities, they are often limited. For example, if the CEO is the only one who is able to make a compliance statement, it allows the government to personally make the CEO liable for any wrong statements made, but

it also places a significant liability on the CEO who is rarely technically qualified to undertake or supervise the verification.

In the case of third party and government body control entities, the qualifications of staff are externally determined. This can be a challenge for government bodies, which will need to ensure that their control units have working staff qualified for a number of different NAMA programmes. The third parties will normally have to demonstrate their competence through an accreditation process. In the absence of any specific requirements for Third Party assessments, Second Party control entities are used. These will then have to demonstrate to the market that they have the specific expertise required to develop, implement and control MRV requirements for NAMA.

4.5.1 Accreditation

Accreditation is normally associated with third party auditing companies. In most cases the accreditation is done through national accreditation bodies, but there are also other means of accrediting. For those NAMAs that rely on third party audits it will be necessary to set up an accreditation process that clearly defines who can be considered a third party and what it needs to demonstrate in order to become accredited. This can be done through the government body responsible for the NAMA, through training centers or through the national accreditation bodies. Training centers commonly

Table 6: Different types of Control Entities

Control Entity	Description
First Party	An internal audit that an organization performs on itself. Often part of an organization's internal quality assurance procedures. Could be used in connection with a self-declaration by a company or CEO to confirm compliance with NAMA obligations. It could also be conducted prior to a 2nd or 3rd party verification, to uncover any foreseeable problems that can be resolved internally.
Second Party	Verification conducted by a buyer, a supplier, or another organization that has a direct interest in the results of the verification. Not acceptable if, for example, GHG assertion are used to register allowances or credits in an emissions trading market, but may be acceptable in cases where an organization is providing a disclosure report on compliance with NAMA obligations.
Third Party	Verification conducted by an independent and qualified individual or organization, depending on the rules and terms of the verification. Could typically be used when the GHG assertion is necessary in a NAMA programme with regulatory compliance implications or used in a transaction within an emissions trading market.
Government Body	Government Body is understood to be a declaration by a government institution for a company which participates in a specific NAMA.

focus on and specialize in individual capabilities, while national accreditation bodies look at both individuals' and organizational capabilities of a third party control entity.

4.6 Registry, Issuance and Compliance

In 2009, the Copenhagen Accord instituted that "supported NAMAs - those funded by Annex I (developed) countries - will be listed in a registry and subject to international measurement, reporting and verification (MRV)". The Cancun agreement established a work programme to clarify and operationalize issues such as the design of the registry, international rules on MRV and improved greenhouse gas emissions reports from non-Annex I parties.

The scope, as adopted in Durban, of information to be provided in developing countries' Biennial Update Reports (BUR), includes not only a national inventory of anthropogenic emissions by sources¹², but also a national inventory report and information on "mitigation actions" as outlined below. NAMAs for which international support is sought are to be submitted to the UNFCCC Registry following the same format for information as for "mitigation actions" in the BUR (Annex III to the report of the AWG-LCA (FCCC/AWGLCA/2011/L.4).

"Non-Annex I Parties should provide information, in a tabular format, on actions to mitigate climate change, by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol."

It is suggested that this information where relevant be related to proposals for actions already submitted by non-Annex-I Parties. These proposals have been compiled in document FCCC/AWGLCA/2011/INF.1. Information required, according to Annex III, is

- a. Name and description of the mitigation action, including information on the nature of the action, coverage (i.e. sectors and gases), quantitative goals and progress indicators;
- b. Information on methodologies and assumptions;
- c. Objectives of the action and steps taken or envisaged to achieve that action;
- d. Information on the progress of implementation of the mitigation actions and the underlying steps taken or envisaged, and the results achieved, such as estimated outcomes (metrics depending on type

of action) and estimated emissions reductions, to the extent possible;

- e. Information on international market mechanisms.

Further, the information contained in the BURs will be subjected to an international consultation and analysis (ICA) process. Annex III states that "Parties should provide information on ... domestic measurement, reporting and verification arrangements."

NAMAs are governmental instruments and even though NAMAs do not necessarily deliver certified emission reductions or other tradable carbon units, there will be a compliance component. If NAMAs generate a tradable unit, there needs to be a clear understanding of which entity is responsible for the creation of the tradable unit. The host country should be central in the issuance and compliance process but may delegate the responsibility to some kind of control entity. The issuance and compliance could also be part of an international agreement whereby tradable units are only created when they are forwarded for issuance to an international reporting unit.

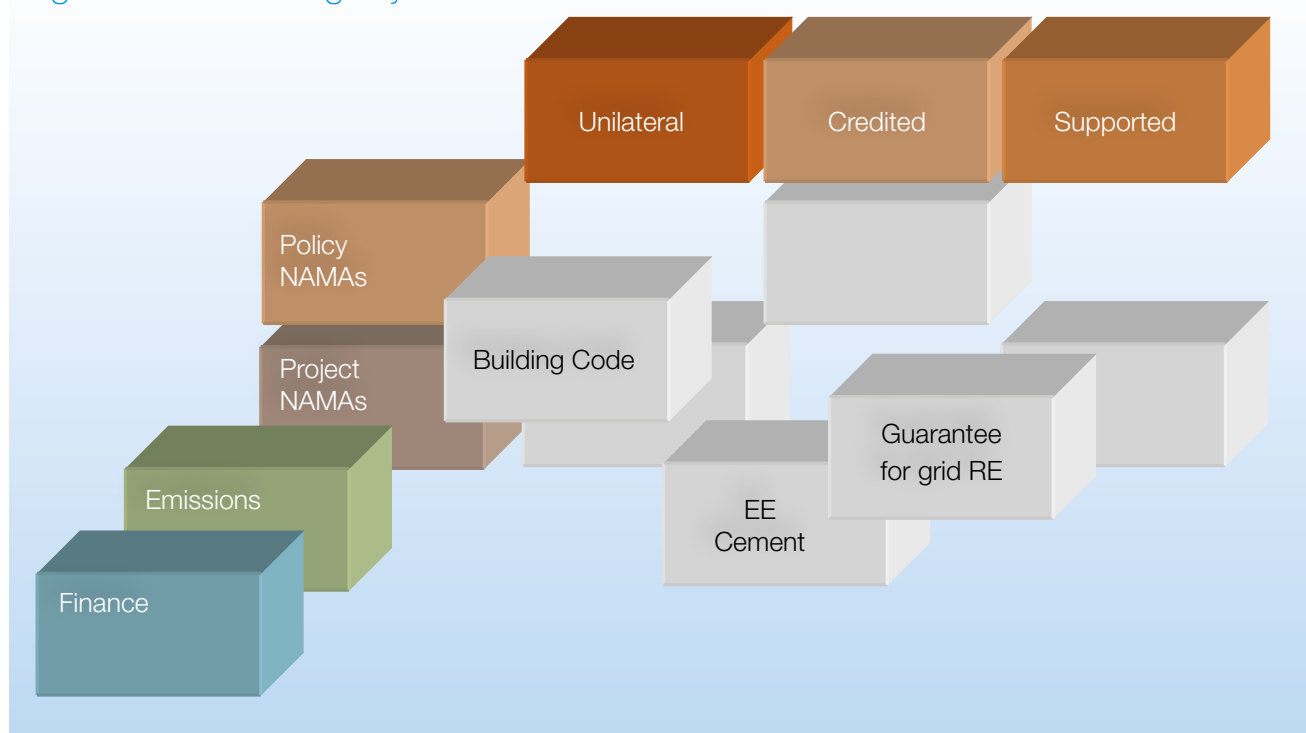
Keeping track of activities, with a view to coordinating and optimizing their impact, requires transparent reporting systems. Such systems could be anchored with a CCU, potentially employing open access databases, which would be an option that would link ideally with the central UNFCCC NAMA Registry.

At COP16, in Cancun, it was decided to set up a registry to record Nationally Appropriate Mitigation Actions seeking international support and to facilitate matching of finance, technology and capacity-building support for these actions. Further, it was decided to establish a separate section of the registry to recognize unilateral NAMAs of developing countries. The structure of the registry is not yet established, but it is clear that an international NAMA registry will be established within the UNFCCC Secretariat where developing countries will submit their pledges as well as their requests for funding for supported NAMAs to the UNFCCC.

This is where the international assistance will be recorded and matched against proposed mitigation actions. It includes the support made available by developed countries and other entities and will show the support received for individual NAMAs. The registry can be illustrated as an information matrix like the one shown in Figure 3— with additional registry options for matching finance. The information in the registry can be useful in assessing the impact of actions and the level of support at the global level.

¹² as well as removal by sinks of all greenhouse gases (GHGs) not controlled by the Montreal Protocol

Figure 3: NAMA Registry



The NAMA registry that is to be established by the UNFCCC Secretariat will include not only the categories presented in Figure 3 below, but probably more. The three NAMAs that are mentioned illustrate the linkages between NAMAs, all with direct or indirect impact on emissions reduction in the building sector, i.e.:

1. a unilateral policy NAMA measured in emissions (building code),
2. a credited project NAMA measured in emissions (energy efficiency in the cement sector), and
3. a supported policy NAMA measured in finance (guarantee for investment in grid connected renewable energy).

The efficiency of each initiative is influenced by the other. Efficient cement production will reduce the carbon footprint of the cement used in the building sector; a building code sets standards for consumption as well as construction to reduce the total carbon footprint of the building sector; the inclusion of more renewable energy on the grid will reduce the emissions reduction effect of energy efficiency in other sectors. Such linkages illustrate the importance of keeping track of linkages between NAMAs. The challenge is to attribute results to one or the other part of the concerted NAMA. Options for reporting finance on one and emissions on another entails the risk of double counting.

4.7 Minimum MRV system requirements for NAMAs

The capacity of developing countries to implement these MRV elements will differ. It is important to establish a set of minimum MRV requirements for different NAMAs for guidance. Table 7 provides a suggested list of minimum requirements with some key characteristics.

Table 7: Minimum MRV System requirements for the different NAMA types

MRV Elements Block	Unilateral NAMA	Internationally Supported NAMA	Credited NAMA
Scope	Activity which impacts emissions of one of the KP gases such as: <ul style="list-style-type: none"> • Energy efficiency programme • Emission reporting programme • Emission Reduction programme 	Activity which impacts emissions of one of the KP gases <ul style="list-style-type: none"> • Energy efficiency programme • Emission reporting programme • Emission Reduction programme 	Activity which impacts emissions of one of the KP gases <ul style="list-style-type: none"> • Energy efficiency programme • Emission reporting programme • Emission Reduction programme
Programme Oversight	Government Department Using: <ul style="list-style-type: none"> • national incentive programme mechanisms 	Multilateral Agreement Using: <ul style="list-style-type: none"> • national legislation of cooperating Parties • National Accreditation Bodies 	International Body Using: <ul style="list-style-type: none"> • International binding legislation • National Accreditation Bodies
Issuance and Compliance Body	Government Body	Government Body endorsed by Parties' signatures to the Multilateral agreement	International Body; or Government Body recognized under International agreement
Standards	Domestic Standard	Bilateral Standard	ISO Standard or International recognised standard
Control Entity and Qualifications	First /second Party – staff qualifications determined defined by control entity	Third Party or government body	Third Party
Monitoring & Reporting (Programme Participant/Installation Level)	Available to participant only, but archived for possible inspection by programme oversight body	Available to oversight body and participant only	Publically Available
MRV Reporting (National Level)	Internally available for assessment of implementation success only	Publically available on participant basis (registry) Internally available	Publically Available

5. Developing country capacities for MRV implementation

According to the final Bali decision (CP. 13, 2007), developing country Parties should take “Nationally appropriate mitigation actions ... in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner.” While such mitigation actions may be MRV’able in theory, it may well fall beyond the means of host countries to carry out such MRV activities in practice as it depends both on the type of action and the level of administrative capacity of that particular Party. Hence, the Bali decision calls for capacity building.

The Copenhagen Accord further specifies some important aspects regarding MRV:

- » Mitigation actions by developing countries shall be communicated every two years via biennial update reports and through national communications every four years.
- » MRV of unilateral NAMAs will be conducted domestically.
- » Supported NAMAs are subject to international MRV according to guidelines by the COP.

The Durban outcome is even more specific on the reporting requirements for developing countries through the Biennial Update Reports and the International Consultation.

As described earlier, the MRV systems and legal traditions differ between countries. Similarly, the implementation of the MRV frameworks will depend on NAMA types and which sectors of the economy they are targeting. The capacities of developing countries to implement the MRV frameworks will also differ and in order to further discuss this implication, a theoretical division in three levels was established to distinguish the actual readiness and capacities of countries for MRV:

M1: Full capacity, i.e. national MRV systems in place (or to be put in place) that are sufficient for inter-

national reporting and immediately underpin both supported and credited NAMAs

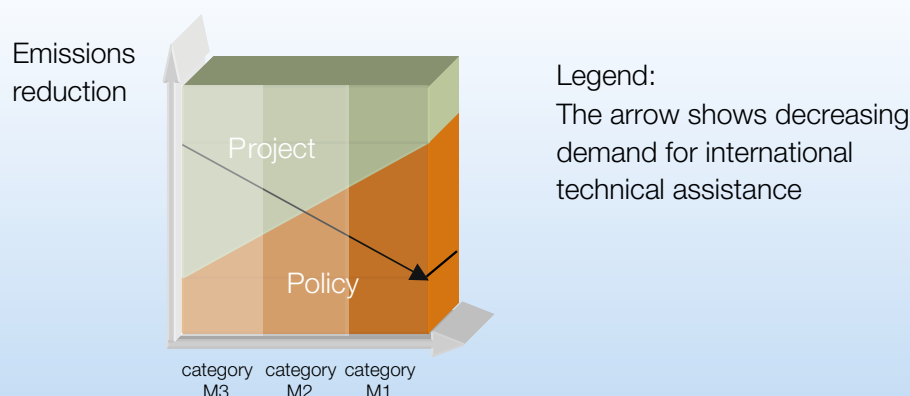
M2: Good capacity, but still requiring capacity building to support international verification of supported and/or credited NAMAs

M3: Limited capacity that require significant capacity building both for national MRV processes as well as international MRV

The different levels of readiness will have implications for determining which types of NAMAs are most feasible for a country. Advanced NAMA programmes and policies that tap into elaborate environmental legislation or well-established and efficient energy sector regulation will be most appropriate for countries in group M1, while countries in group M3 may benefit from more project based approaches that do not rely as much on well-functioning macro systems. Figure 4 illustrates the probable weight of activities divided between policy NAMAs and specific project NAMAs as a function of the national capacity to administer MRV systems. To the left in the figure are M3 countries that adopt a project based approach with fewer strategic elements and a more immediate focus on implementation of projects with multiple benefits, including that of emissions reduction. In these countries policy options are relatively few and enforcement structures relatively weak. Instead, they might concentrate on activities which have obvious parallels to the CDM Programme of Activity (or stand-alone CDM projects) and thereby benefit from existing MRV structures, methodologies, and/or an existing service supplier network. If a supported NAMA structure, instead of a crediting model, is the basis for such project activities it may even employ a less stringent verification regime. In general, the project approach might be more appropriate in countries with less administrative capacity.

To the right in Figure 4 are countries that focus more on policies, which will lend themselves to reporting by

Figure 4: Capacity and capabilities of developing countries



proxies or qualitative process metrics and subsequent tracking of emissions reductions stemming from these initiatives. Inspiration for such MRV structures may be sought in current practices for budget support in general development assistance, where country driven approaches to monitoring and evaluation is gaining ground as a fundamental principle. While these practices may be stepping stones, they will not constitute fully fledged MRV systems for emissions reduction, but will at some point require a ‘translation system’ to convert proxies into figures – at least ballpark figures – for achievements in terms of emissions reduction (reference is also made to the earlier discussion on boundaries and the need for a common yardstick). This may also be relevant for countries finding themselves in category M2 (centre of Figure 4), i.e. countries with some capacity and potential for both policy and project type NAMAs, but requiring funding for both. These countries are also likely to be recipients of development assistance, and the MRV of NAMAs that have their origins in low emission development strategies and national planning frameworks may be mainstreamed into existing national systems for monitoring and evaluation of development assistance and results. Such mainstreaming requires that financing agreements for supported NAMAs are explicit about the measurement systems and targets agreed. Such clearness will require additional metrics related to emissions reduction, possibly inspired by the typology provided in chapter 4. Translation systems converting financial or other data into (estimates of) emissions reduction will be developed on a case-by-case basis – and in cases where bilateral donors are involved also in collaboration with donors with the aim to specifically assess the contribution of policy based NAMAs to national emissions reductions. To give an example: A typical A-F labeling requirement for household appliances, in this case air conditioners and refrigerators, is introduced in the hope that con-

sumers will prefer the more expensive and more energy efficient models. If data can be collected from retailers and baseline data can be retrieved (earlier distribution of sales on different models) then emissions reduction can be measured as the change in behavior and an assumed daily usage of the appliances. This would be a unilateral NAMA with no need for finance, assuming that the costs of labeling are borne by the manufacturers. If a donor now wishes to promote sales of more energy efficient appliances and offers to pay a subsidy for the efficient models, for instance through a reduction of import duty on those models (i.e. the donor pays the import duty for these models), then measurement of emissions reduction could be based on the import duty paid by the donor, as there would be a possible linkage between the labeling and the import duty replaced by the donor.

This example easily lends itself to assessment of a given host country’s capacity to implement measurement and reporting structures – in this particular sector, i.e. its ability to operate a measurement and reporting system for this particular appliances example does not mean that it would have similar competencies in any other sector.

Development of domestic capacity for MRV of NAMAs requires institutional development, education, training and capacity development for relevant evaluation/MRV units. All of these may either constitute separate (donor funded) activities or they may be considered as an integral element of a phased supported NAMA in an agreement between a funding party and a host country. The categorization of countries in three groups (or more if desired) can be made by using proxies, e.g. indices, to determine the capacity and capabilities of a country. For instance, indices such as the Human Development Index (HDI) or indices produced by Transparency International may give an indication of the institutional

capacities of a country. A much more direct evaluation, however, would specifically assess the capacities on the MRV elements discussed in this Primer. Such evaluations need not be authoritative or based on international standards, and may, at least initially, resemble a 'self-assessment' exercise that feeds into the LCDS and NAMA prioritization process.

The evaluations should also be sector specific. No country, developing or developed, has equally well developed MRV frameworks in all sectors. A country can therefore belong to all three categories at the same time, but in different sectors. The assessments may also be helpful in evaluating what types of NAMAs are more relevant in certain sectors compared to others or which sectors are more obvious targets for NAMAs than others.

Such discussions will ultimately have to link to the issue of financing. To the extent that NAMAs are proposed as unilateral initiatives, MRV requirements are now laid down in the Durban outcome as earlier described. These requirements, however, do not preclude additional criteria introduced by donors that engage in supported NAMAs. Consultations between a donor – bilateral or multilateral – and a possible NAMA host country may first consider reviewing a self-assessment that may have been performed by the host country in one or more sectors of interest. Such a review could reveal which sectors would be more appealing in terms of attracting funding.

It may, at a first glance, seem as if the initial MRV capacity determines the access to funding or the other way around, that it is not the country's capacity, but its demand for funding which determines the various kinds of requirements for MRV. These are concerns that at the general level have also been raised in recent years in traditional development assistance, emphasizing a major shift towards country driven approaches.

The country driven approaches may, if not implemented carefully, represent a risk of 'raising the bar' in the sense that countries unable to meet the reporting or institutional requirements may have difficulties in accessing donor funding. A further challenge is that NAMAs that succeed on the basis of bilateral funding donors, while respecting the country driven approach, may still have basic requirements that are not aligned. There is a risk of involuntarily creating a patchwork of donors with preferred recipient countries, recipient countries meeting only a selection of donors' criteria and even some countries potentially falling entirely through. It is therefore important to take proper steps to ensure a basic MRV structure. It is also for this reason that the project based approach must remain an option, as illustrated in Figure 4.

5.1 Types of NAMAs, levels of capacity, and elements of an MRV system

As per definition, NAMAs are country driven. Standards for national appropriateness, including the appropriateness of formulation, cannot be centrally established and hence there cannot be a vigorous scrutiny of completeness of submissions. At most there can be guidance. As is already clear from current pledges under the Copenhagen Accord, there are immense differences in the approaches to adopting NAMAs. For the system to work, and particularly for the funding mechanisms to function, more details are probably necessary, but it will ultimately be the countries' prerogative to decide the national appropriateness of the structure of, and the definition of, the NAMA.

It is indeed possible that MRV systems related to such nationally determined actions will require less rigorous scrutiny of the actual performance of the implemented NAMA compared to current CDM routines. In negotiations between the host country and the funding institutions (for example: Green Climate Fund, multilateral, bilateral or others), the performance and the performance indicators will probably have been agreed upon. The MRV capacities will equally be evaluated in this context.

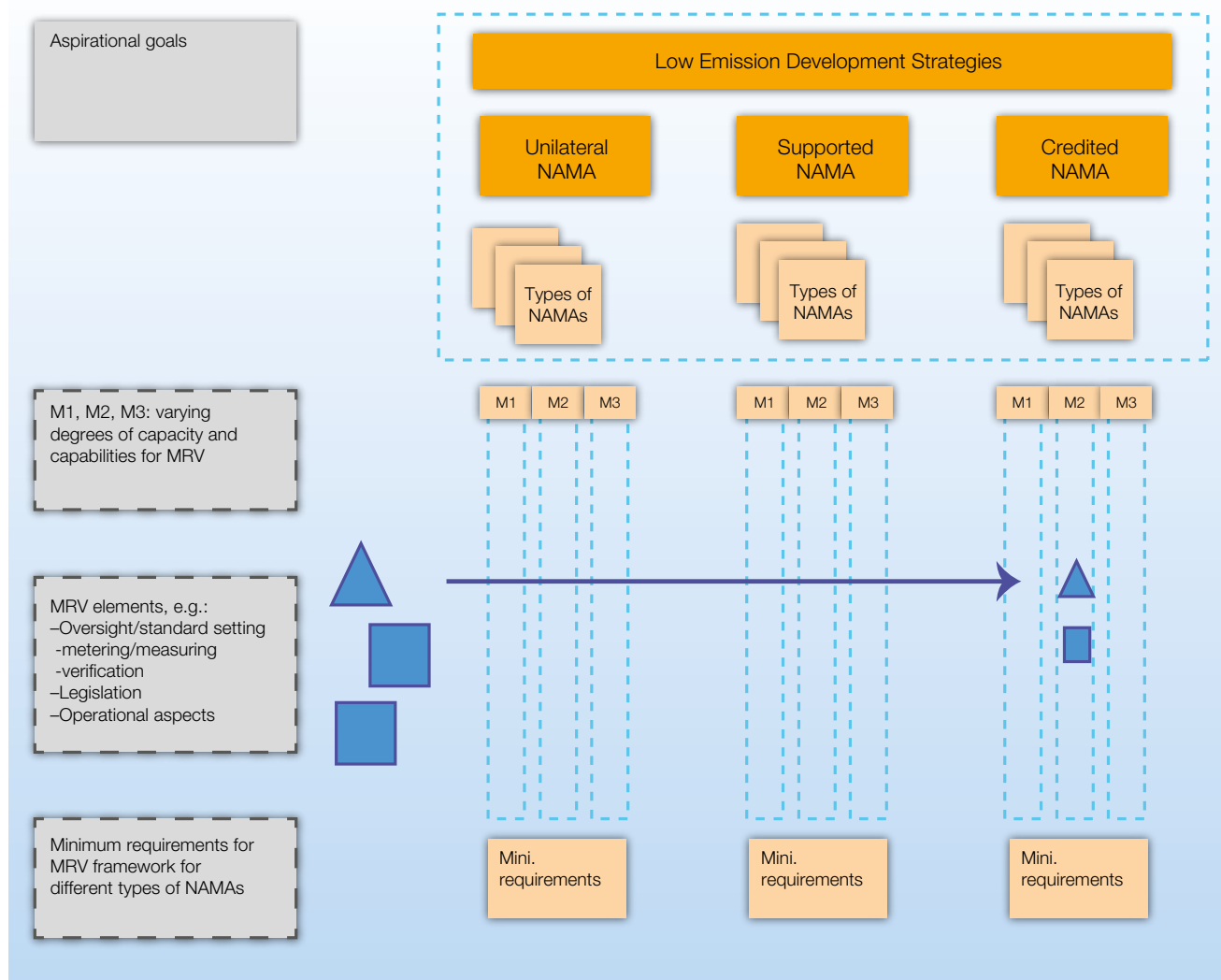
These elements are brought together in Figure 5 that places a given NAMA in a given country in a specific MRV context; drawing upon the MRV elements described in Chapters 3 and 4. The assessment will need to be sector-wise, as countries do not have uniform capacities across sectors.

Figure 5 sets the NAMAs in the context of low carbon development strategies and divides them into the three categories defined earlier, i.e. unilateral, supported and credited NAMAs. Within each of these three categories the implementation required to achieve the minimum MRV requirements will differ depending on the capacity and capabilities of the country. The MRV requirements are met by introducing the missing MRV elements from the 'toolbox' on the left.

For instance, if a country has suggested a supported renewable energy NAMA, and has assessed itself as a 'category M2' country in the energy sector, a potential donor and the NAMA host country would immediately be able to identify the relevant MRV elements to be included and the NAMA host country's responsiveness on supplying these elements.

Implementation of unilateral NAMAs is believed to be within the existing capacities of respective line ministries (otherwise they would be implemented with international support). Performance will be measured and

Figure 5: MRV elements and minimum requirements



probably reported as part of annual reporting processes already on-going for other activities and projects. Thus, existing reporting structures will be employed.

Internationally supported NAMAs will require the most elaborated institutional structuring and will probably benefit from incorporating already existing modalities and procedures from administration of development assistance. In many cases, this will involve the Ministry of Finance which will keep track of funds available from international sources and the disbursement against purposes agreed, but agreements may also be directly with line ministries. A key challenge is to link assistance provided to actual implementation of emissions reduction activities.

Countries have differing abilities and capacities for establishing institutions necessary to perform the above verification and reporting tasks. It is, however, more a question of performing the task than putting the institutional structures in place, as no additional institutional structures are formally required. That said, emissions reporting may not be a mainstream administrative task

in most of the ministries that are potentially relevant for overseeing projects and policies related to emissions reduction. Capacity building is needed, and may be provided separately or as part of specific NAMAs. Financial reporting on the other hand may be more straightforward, carried out by the Ministry of Finance, which in many cases will have experience in administering development assistance.

It must be expected that few developing countries have sufficient resources and systems to provide the necessary reporting. Capacity shortfalls will have to be addressed by accommodating external assistance within these existing administrative structures, which may partially serve to help build capacity in order to establish such rigorous routines and capabilities. In the short term, it may be necessary to ensure the actual reporting with the provision of full-time technical assistance. Such assistance could reduce differences in the quality of reporting among countries (and sectors) and thus avoid the risk of exacerbating already existing biases in financial flows from developed to developing countries.

6 .The way forward in designing a rigorous MRV system

Establishing guidelines for MRV systems intended to support the implementation of Nationally Appropriate Mitigation Actions, the official definition of which still remains outstanding, is not straightforward. Elaborating pathways to take us from the current situation to one with well-established NAMAs and MRV systems is even more challenging. The overarching principle of national appropriateness, however, is probably the guiding light by which each country will find their way, not following a top-down prescriptive approach, but determining first the national appropriateness of mitigation actions, the means of implementation and finally the way in which MRV systems can be devised that provide evidence of performance in a sufficiently rigorous manner. It also follows from this that it is not the MRV options that determine the feasibility of a NAMA, but the feasibility of the NAMA that determines the possible MRV structure.

There will probably be no two countries that follow the same pathway. The challenge here is that not all pathways are equally long. Some will take the highway, and some may use a longer and winding road, thus obviously not reaching the point of 'readiness for implementation' at the same time. This could jeopardize the emissions reduction objectives as the obvious reduction options maybe missed or delayed. More importantly, it could jeopardize the equal access to funding.

To partly mitigate this, the 'nationally appropriate pathways' could be guided by the setting of milestones at the international level. While the timing should be fixed at a global level, the milestones should not be normative. Rather they should define the level of progress towards an end goal, which is derived from the elaboration of a Low Carbon Development Strategy (LCDS).

The setting of milestones might also be helpful in determining the need for capacity building, and thus also the prioritization of efforts to build this capacity. Following the principles outlined in this Primer, this may also

include filling in the temporary capacity gaps through the provision of external assistance to ensure that the differences in 'arrival times' at the point of readiness is reduced to a minimum.

Thus, it is obvious that the pathways for MRV cannot be seen in isolation. It is integrated with the entire process of establishing national LCDs and NAMAs and probably only becomes relevant in the end phases of the process, reflecting the above indication of a 'NAMAs first principle'. Nevertheless, only informed exchanges will take the process forward, and it is hoped that this first MRV Primer is inspirational, especially for understanding what will need to be measured, reported and verified in a future climate regime to ensure the continued concerted effort in combating climate change.

Annex 1

The table below shows how the metrics detailed in Chapter 4 might be applied to different types of NAMAs. Time series of data would equally be important, though these naturally will have to be accumulated

over time for those types of data that are currently not recorded or collected. Collected data would naturally feed into the Biennial Update Reporting (BUR) routines to be established.

Examples of metrics for different types of NAMAs

Example NAMA	Quantitative Financial metrics	Quantitative Process metrics	Quantitative Technical metrics	Qualitative metrics
Capacity building NAMA	<ul style="list-style-type: none"> Donor investment and recipient fund allocation for capacity building 	<ul style="list-style-type: none"> Establishment of data and record keeping systems at national level 		<ul style="list-style-type: none"> Quality of data system
Building energy efficiency	<ul style="list-style-type: none"> Donor investment and recipient fund allocation for retrofitting of buildings Cost of retrofitting office buildings per square metre 	<ul style="list-style-type: none"> Number of buildings with energy management systems implemented Number of energy efficient devices installed 	<ul style="list-style-type: none"> Reduction in energy use in buildings with an implemented energy management system Recording the “power” of the device installed (as per CDM methodology) Metering the “energy use” of an appropriate sample of the devices installed (as per CDM methodology) 	<ul style="list-style-type: none"> Assessment of behaviour-based energy management outcomes following training
Sectoral emissions reductions programme	<ul style="list-style-type: none"> Donor investment and recipient fund allocation for technology diffusion 	<ul style="list-style-type: none"> Establishment of sectoral inventory including baseline and reporting systems 	<ul style="list-style-type: none"> Estimated reduced avoided emissions (t-CO₂ eq) at the facility level Estimated reduced avoided emissions (t-CO₂ eq) at the sector level 	<ul style="list-style-type: none"> Quality of sectoral inventory including baseline and reporting systems

UNEP Risø Centre (URC) is a leading international research and advisory institution on energy, environment, climate, and sustainable development. With a research team of 40 scientists and economists from 16 countries, UNEP Risø works hand in hand with the United Nations Environment Programme (UNEP), supporting and promoting UNEP activities in the areas of energy and climate change.

URC was established in 1990 by UNEP, the Danish Ministry of Foreign Affairs and Risø DTU. The Centre is located in Denmark at the Danish Technical University (Risø Campus).

www.uneprisoe.org